

Serial No. 10/623,437

January 26, 2006

Page 3

CURRENT LISTING OF CLAIMS:

1. (Currently amended) A combined positron emission tomography (PET) and X-Ray computerized computed tomography (CT) tomograph apparatus for acquiring PET and CT images with a known geometric relationship between pixels of said images, said combined PET and X-Ray CT tomograph apparatus comprising:

a CT scanner having ~~a patient gantry~~, said CT scanner including a plurality of detectors, said CT scanner being provided for acquiring [a] CT image data of a desired region of a patient;

a PET scanner having ~~a patient gantry separate from said CT scanner patient gantry~~, said PET scanner including a plurality of detectors, said PET scanner being provided for acquiring [a] PET image data of a desired region of said patient within a field of view having a predefined relationship with a field of view of said CT scanner, so as to establish said known geometric relationship;

a patient support for supporting a patient positioned ~~within~~ for imaging by each of said CT scanner ~~patient gantry~~ and said PET scanner ~~patient gantry~~, said patient support being movable within said apparatus such that desired regions of said patient may be imaged both by said CT scanner and by said PET scanner axially within each of said ~~CT scanner patient gantry and said PET scanner patient gantry~~; and

a processor that processes said CT image data and said PET image data to generate display device for displaying at least one of said CT image, said PET image and a fused PET/CT image generated by said combined PET and X-Ray CT tomograph.

2. (Currently amended) The combined PET and X-Ray CT tomograph apparatus of claim 1 wherein said CT scanner ~~patient gantry~~ is fixed relative to said PET scanner ~~patient gantry~~, said patient support being movable between said CT scanner ~~patient gantry~~ and said PET scanner ~~patient gantry~~.

3. (Cancelled)

Serial No. 10/623,437

January 26, 2006

Page 4

4. (Currently amended) A combined positron emission tomography (PET) and X-Ray CT apparatus as set forth in claim 1, further comprising ~~computerized tomography (CT) tomograph for acquiring PET and CT images with a known geometric relationship between pixels of said images, said combined PET and X-Ray CT tomograph comprising:~~

~~a CT scanner having a patient gantry, said CT scanner including a plurality of detectors, said CT scanner being provided for acquiring a CT image;~~

~~a PET scanner having a patient gantry separate from said CT scanner patient gantry, said PET scanner including a plurality of detectors, said PET scanner being provided for acquiring a PET image;~~

~~a patient support for supporting a patient positioned within each of said CT scanner patient gantry and said PET scanner patient gantry, said patient support being movable axially within each of said CT scanner patient gantry and said PET scanner patient gantry;~~

~~a processor for reconstructing said CT image to achieve a reconstructed CT image, for reconstructing said PET image to achieve a reconstructed PET image, and for generating a fused PET/CT image; and~~

~~a display device for displaying at least one of said reconstructed CT image, said reconstructed PET image and said fused PET/CT image.~~

Claims 5 – 9 (Cancelled).

10. A combined positron emission tomography (PET) and X-Ray CT apparatus as set forth in claim 1, wherein said processor further ~~computerized tomography (CT) tomograph for acquiring PET and CT images with a known geometric relationship between pixels of said images, said combined PET and X-Ray CT tomograph comprising:~~ a CT scanner having a patient gantry, said CT scanner including a plurality of detectors, said CT scanner being provided for acquiring a CT image; a PET scanner having a patient gantry separate from said CT scanner patient gantry, said PET scanner including a plurality of detectors, said PET scanner being provided for acquiring a PET image; a patient support for supporting a patient positioned within each of said CT

Serial No. 10/623,437

January 26, 2006

Page 5

~~scanner patient gantry and said PET scanner patient gantry, said patient support being movable axially within each of said CT scanner patient gantry and said PET scanner patient gantry; a processor for reconstructing said CT image to achieve a reconstructed CT image, for reconstructing said PET image to achieve a reconstructed PET image, for correcting said reconstructed PET image to achieve a corrected PET image, for generating attenuation correction factors from said reconstructed CT image data for correcting said PET image data, and for generating a fused PET/CT image; and a display device for displaying at least one of said reconstructed CT image, said corrected PET image and said fused PET/CT image.~~

Claims 11-15 (Cancelled).

16. (Currently amended) A combined positron emission tomography (PET) and X-Ray CT apparatus as set forth in claim 1, wherein said processor further computerized tomography (CT) tomograph for acquiring PET and CT images with a known geometric relationship between pixels of said images, said combined PET and X-Ray CT tomograph comprising: a CT scanner having a patient gantry, said CT scanner including a plurality of detectors, said CT scanner being provided for acquiring a CT image; a PET scanner having a patient gantry separate from said CT scanner patient gantry, said PET scanner including a plurality of detectors, said PET scanner being provided for acquiring a PET image; a patient support for supporting a patient positioned within each of said CT scanner patient gantry and said PET scanner patient gantry, said patient support being movable axially within each of said CT scanner patient gantry and said PET scanner patient gantry; a processor for correcting said CT image for artifacts due to field of view truncation, for reconstructing said CT image to achieve a reconstructed CT image, for reconstructing said PET image to achieve a reconstructed PET image, and for generating a fused PET/CT image; and a display device for displaying at least one of said reconstructed CT image, said reconstructed PET image and said fused PET/CT image.

Claims 17-42 (Cancelled).

Serial No. 10/623,437

January 26, 2006

Page 6

43. (Currently amended) A combined positron emission tomography (PET) and X-Ray computerized computed tomography (CT) tomograph apparatus for acquiring PET and CT images with a known geometric relationship between pixels of said images, said combined PET and X-Ray CT tomograph apparatus comprising:

[a] CT image means for acquiring a CT image, said CT image means including a plurality of detectors;

[a] PET image means for acquiring a PET image, said PET image means including a plurality of detectors mounted on in fixed relationship to said CT image means plurality of detectors;

[a] patient gantry means for use with both said CT image means and said PET image means;

[a] patient support means for supporting a patient positioned within said patient gantry means, said patient support means being movable axially within said patient gantry means; and

[a] display means for displaying at least one of a reconstructed CT image, a reconstructed PET image and a fused PET/CT image generated by said combined PET and X-Ray CT tomograph.

44. (Currently amended) A combined positron emission tomography (PET) and X-Ray computerized computed tomography (CT) tomograph apparatus as set forth in claim 43, further comprising: for acquiring PET and CT images with a known geometric relationship between pixels of said images, said combined PET and X-Ray CT tomograph apparatus comprising:

a CT image means for acquiring a CT image, said CT image means including a plurality of detectors; a PET image means for acquiring a PET image, said PET image means including a plurality of detectors mounted on in fixed relationship to said CT image means plurality of detectors; a patient gantry means for use with both said CT image means and said PET image means; a patient support means for supporting a patient positioned within said patient gantry means, said patient support means being movable axially within said patient gantry means;

Serial No. 10/623,437

January 26, 2006

Page 7

[a] processor means for reconstructing said CT image to achieve a reconstructed CT image, for reconstructing said PET image to achieve a reconstructed PET image, and for generating a fused PET/CT image; and a display means for displaying at least one of said reconstructed CT image, said reconstructed PET image and said fused PET/CT image.

Claims 45 - 48 (Cancelled).

49. (Currently amended) A method for acquiring PET and CT images, comprising the steps of:
~~within a combined PET and X-Ray CT tomograph, the combined PET and X-Ray CT tomograph including a CT scanner having a patient gantry, a PET scanner having a patient gantry, a patient support for supporting a patient positioned within each of said CT scanner patient gantry and said PET scanner patient gantry, and a display device, said method comprising the steps of: introducing a tracer into a patient for detection by said combined PET and X-Ray CT tomograph; waiting for an uptake period to expire, the tracer being circulated through and absorbed by the patient during said uptake period;~~

placing the a patient on said a patient support;

moving said patient support to position the patient within said a CT scanner patient gantry such that a selected region of said patient to be studied imaged is within a field of view of said a CT scanner associated with said CT scanner patient gantry;

acquiring [a] CT image data of the selected region of the patient;

moving said patient support to position the patient within said a PET scanner patient gantry such that the said selected region to be studied imaged is within a field of view of said a PET scanner associated with said PET scanner patient gantry;

acquiring [a] PET image data of the selected region of the patient; and

reconstructing said a PET image from said acquired PET image data and using said acquired CT image data, to achieve a reconstructed PET image.

Serial No. 10/623,437

January 26, 2006

Page 8

50. (Currently amended) The method of claim 49, during said step of acquiring a PET image of the selected region of the patient, further comprising the step of continuously moving said patient support in an axial direction within said PET scanner patient gantry, whereby normalization effects between individual detector rings of said PET scanner are eliminated.

51. (Currently amended) The method of claim 49 wherein said CT scanner patient gantry is separate from and fixed relative to said PET scanner patient gantry, said patient support being movable between said CT scanner patient gantry and said PET scanner patient gantry, whereby said step of acquiring [a] CT image data of the selected region of the patient is accomplished within said CT scanner patient gantry, and whereby said step of acquiring [a] PET image data of the selected region of the patient is accomplished within said PET scanner patient gantry.

52. (Currently amended) The method of claim 49 wherein said CT scanner patient gantry is separate from said PET scanner patient gantry, wherein at least one of said CT scanner and said PET scanner is movable with respect the other, and wherein said patient support is movable between said CT scanner patient gantry and said PET scanner patient gantry, whereby said step of acquiring [a] CT image data of the selected region of the patient is accomplished within said CT scanner patient gantry, and whereby said step of acquiring [a] PET image data of the selected region of the patient is accomplished within said PET scanner patient gantry.

53. (Original) The method of claim 52 wherein said step of moving said patient support to position the patient within said CT scanner patient gantry is accomplished by moving said CT scanner to receive said patient bed within said CT scanner patient gantry.

54. (Original) The method of claim 52 wherein said step of moving said patient support to position the patient within said PET scanner patient gantry is accomplished

Serial No. 10/623,437

January 26, 2006

Page 9

by moving said PET scanner to receive said patient bed within said PET scanner patient gantry.

55 (Cancelled).

56. (Currently amended) The method of claim [55] 49, ~~after said step of acquiring a CT image and before said step of reconstructing said CT image~~, further comprising the step of correcting said CT image data for artifacts due to field of view truncation.

57. (Currently amended) The method of claim 56 wherein said step of correcting said CT image data includes the steps of:

obtaining [a] non-corrected PET image data, ~~said non-corrected PET image reconstructed without attenuation correction;~~

determining a boundary of a truncated portion of the selected region of the patient using said a non-corrected PET image reconstructed from said non-corrected PET image data;

estimating a volume within said boundary of the truncated portion of the selected region using an average linear attenuation coefficient for the truncated portion of the selected region; and

adding said volume to said CT image data.

58. (Currently amended) The method of claim [55] 49 further including the step of displaying at least one of said reconstructed CT image and said reconstructed PET image.

59. (Currently amended) The method of claim [55] 49 further including the step of fusing said reconstructed CT image and said reconstructed PET image to achieve a fused PET/CT image.

60. (Currently amended) The method of claim [55] 49, ~~during said step of acquiring a PET image of the selected region of the patient~~, further comprising the step of

Serial No. 10/623,437

January 26, 2006

Page 10

continuously moving said patient support in an axial direction within said PET scanner patient gantry, whereby normalization effects between individual detector rings of said PET scanner are eliminated.

61. (Currently amended) The method of claim [55] 49 wherein said CT scanner patient gantry is separate from and fixed relative to said PET scanner patient gantry, said patient support being movable between said CT scanner patient gantry and said PET scanner patient gantry, whereby said step of acquiring [a] CT image data of the selected region of the patient is accomplished within said CT scanner patient gantry, and whereby said step of acquiring [a] PET image data of the selected region of the patient is accomplished within said PET scanner patient gantry.

62. (Currently amended) The method of claim [55] 49 wherein said CT scanner patient gantry is separate from said PET scanner patient gantry, wherein at least one of said CT scanner and said PET scanner is movable with respect the other, and wherein said patient support is movable between said CT scanner patient gantry and said PET scanner patient gantry, whereby said step of acquiring [a] CT image data of the selected region of the patient is accomplished within said CT scanner patient gantry, and whereby said step of acquiring [a] PET image data of the selected region of the patient is accomplished within said PET scanner patient gantry.

63. (Original) The method of claim 62 wherein said step of moving said patient support to position the patient within said CT scanner patient gantry is accomplished by moving said CT scanner to receive said patient bed within said CT scanner patient gantry.

64. (Original) The method of claim 62 wherein said step of moving said patient support to position the patient within said PET scanner patient gantry is accomplished by moving said PET scanner to receive said patient bed within said PET scanner patient gantry.

Serial No. 10/623,437

January 26, 2006

Page 11

65. (Currently amended) A method for acquiring PET and CT images as set forth in claim 49, further comprising the step of: within a combined PET and X-Ray CT tomograph, the combined PET and X-Ray CT tomograph including a CT scanner having a patient gantry, a PET scanner having a patient gantry, a patient support for supporting a patient positioned within each of said CT scanner patient gantry and said PET scanner patient gantry, and a display device, said method comprising the steps of: introducing a tracer into a patient for detection by said combined PET and X-Ray CT tomograph; waiting for an uptake period to expire, the tracer being circulated through and absorbed by the patient during said uptake period; placing the patient on said patient support; moving said patient support to position the patient within said CT scanner patient gantry such that a selected region to be studied is within a field of view of said CT scanner; acquiring a CT image of the selected region of the patient; reconstructing said CT image to achieve a reconstructed CT image; generating attenuation correction factors for said PET image from said reconstructed acquired CT image data and using said attenuation correction factors to reconstruct a corrected PET image; moving said patient support to position the patient within said PET scanner patient gantry such that the selected region to be studied is within a field of view of said PET scanner; acquiring a PET image of the selected region of the patient; and reconstructing said PET image to achieve a reconstructed PET image.

66. (Currently amended) The method of claim 65, after said step of acquiring a CT image and before said step of reconstructing said CT image, further comprising the step of correcting said CT image data for artifacts due to field of view truncation.

67. (Currently amended) The method of claim 66 wherein said step of correcting said CT image data includes the steps of:

obtaining [a] non-corrected PET image data, said non-corrected PET image reconstructed without attenuation correction;

determining a boundary of a truncated portion of the selected region of the patient using said a non-corrected PET image reconstructed from said non-corrected PET image data;

Serial No. 10/623,437

January 26, 2006

Page 12

estimating a volume within said boundary of the truncated portion of the selected region using an average linear attenuation coefficient for the truncated portion of the selected region; and

adding said volume to said CT image data.

68. (Original) The method of claim 65 wherein said step of generating attenuation correction factors from said reconstructed CT image is performed using the steps of:
estimating an attenuation image at 511 keV using a threshold to separate out a bone component of said reconstructed CT image; and

scaling said bone component using a first scaling factor and a non-bone component of said reconstructed CT image using a second scaling factor.

69. (Original) The method of claim 65 further including the step of displaying at least one of said reconstructed CT image and said reconstructed PET image.

70. (Original) The method of claim 65 further including the step of fusing said reconstructed CT image and said reconstructed PET image to achieve a fused PET/CT image.

71. (Currently amended) The method of claim 65, ~~during said step of acquiring a PET image of the selected region of the patient~~, further comprising the step of continuously moving said patient support in an axial direction within said PET scanner patient gantry, whereby normalization effects between individual detector rings of said PET scanner are eliminated.

72. (Currently amended) The method of claim 65 wherein said CT scanner patient gantry is separate from and fixed relative to said PET scanner patient gantry, said patient support being movable between said CT scanner patient gantry and said PET scanner patient gantry, whereby said step of acquiring [a] CT image data of the selected region of the patient is accomplished within said CT scanner patient gantry, and

Serial No. 10/623,437
January 26, 2006
Page 13

whereby said step of acquiring [a] PET image data of the selected region of the patient is accomplished within said PET scanner patient gantry.

73. (Currently amended) The method of claim 65 wherein said CT scanner patient gantry is separate from said PET scanner patient gantry, wherein at least one of said CT scanner and said PET scanner is movable with respect the other, and wherein said patient support is movable between said CT scanner patient gantry and said PET scanner patient gantry, whereby said step of acquiring [a] CT image data of the selected region of the patient is accomplished within said CT scanner patient gantry, and whereby said step of acquiring [a] PET image data of the selected region of the patient is accomplished within said PET scanner patient gantry.

74. (Original) The method of claim 73 wherein said step of moving said patient support to position the patient within said CT scanner patient gantry is accomplished by moving said CT scanner to receive said patient bed within said CT scanner patient gantry.

75. (Original) The method of claim 73 wherein said step of moving said patient support to position the patient within said PET scanner patient gantry is accomplished by moving said PET scanner to receive said patient bed within said PET scanner patient gantry.

76-90 (Cancelled).

91. (Currently amended) The method of claim [87] 65 wherein said step of reconstructing said attenuation-corrected PET image is accomplished using a Fourier rebinning technique and then independently by an ordered-subset EM iterative reconstruction algorithm.

92-98 (Cancelled).

Serial No. 10/623,437

January 26, 2006

Page 14

99. (Currently amended) A method for acquiring PET and CT images as set forth in claim 49, further comprising the step of: within a combined PET and X-Ray CT tomograph, the combined PET and X-Ray CT tomograph including a CT scanner having a patient gantry, a PET scanner having a patient gantry, a patient support for supporting a patient positioned within each of said CT scanner patient gantry and said PET scanner patient gantry, and a display device, said method comprising the steps of: introducing a tracer into a patient for detection by said combined PET and X-Ray CT tomograph; waiting for an uptake period to expire, the tracer being circulated through and absorbed by the patient during said uptake period; placing the patient on said patient support; moving said patient support to position the patient within said CT scanner patient gantry such that a selected region to be studied is within a field of view of said CT scanner; acquiring a CT image of the selected region of the patient; reconstructing said CT image to achieve a reconstructed CT image; generating attenuation correction factors from said reconstructed CT image; moving said patient support to position the patient within said PET scanner patient gantry such that the selected region to be studied is within a field of view of said PET scanner; acquiring a PET image of the selected region of the patient;

correcting said PET image for scatter to achieve a scatter-corrected PET image; applying said attenuation correction factors to said scatter-corrected PET image to achieve an attenuation-corrected PET image; reconstructing said attenuation-corrected PET image to achieve a reconstructed PET image; fusing said reconstructed CT image and said reconstructed PET image to achieve a fused PET/CT image; and displaying said fused PET/CT image.

100-144 (Cancelled).

145. (Currently amended) A method for acquiring at least a PET image within a PET tomograph apparatus including at least a PET scanner disposed within a patient gantry, and a patient support for supporting a patient positioned within said patient gantry, and a display device, said method comprising the steps of:

Serial No. 10/623,437

January 26, 2006

Page 15

introducing a tracer into a patient for detection by said PET tomograph; waiting for an uptake period to expire, the tracer being circulated through and absorbed by the patient during said uptake period; placing the patient on said patient support;

moving said patient support to position the patient within said patient gantry such that a selected region to be studied imaged is within a field of view of said PET scanner;

acquiring [a] PET image data of the selected region of the patient;

continuously moving said patient support in an axial direction within said patient gantry during said step of acquiring [a] PET image data, whereby normalization effects between individual detector rings of said PET scanner are eliminated;

correcting said PET image data for scatter to achieve [a] scatter-corrected PET image data;

applying attenuation correction factors to said scatter-corrected PET image data to achieve [an] attenuation-corrected PET image data; and

reconstructing said an attenuation-corrected PET image to achieve a reconstructed from said attenuation-corrected PET image data.

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